Notice of Allowability	Application No. 10/785,622	Applicant(s) MACFARLANE SHEARER ET AL.	
	Examiner Phuong Phu	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the Amendment filed on 8/6/07*.

2. ☒ The allowed claim(s) is/are *2,3,7-25,28-30,32,33 and 36-39*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 8/6/07. Accordingly, claims 2, 3, 7-25, 28-30, 32, 33 and 36-39 are currently pending; and claims 1, 4-6, 26, 27, 31, 34, 35, 40 and 41 are canceled.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

IN THE CLAIMS:

Claims 15 and 16 are replaced as follows:

15. (Original) The carrier tracking circuit of claim 7 wherein the delay element comprises a fast Fourier transform (FFT) element and wherein a group of the phase-corrected input samples correspond to a time domain sample of an OFDM symbol, the FFT element being operable to generate as output components a group of frequency components for the OFDM symbol in response to the group of phase-corrected input samples.

16. (Original) An OFDM receiver, comprising:

a radio frequency receiver circuit;

an analog-to-digital converter coupled to the radio frequency receiver circuit;

a serial-to-parallel converter coupled to the analog-to-digital converter;

an FFT circuit coupled to the serial-to-parallel converter;

a parallel-to-serial converter coupled to the output of the FFT circuit;

a symbol demodulation circuit; and

a carrier tracking circuit coupled to the analog-to-digital converter and to the parallel-to-serial converter, the carrier tracking circuit including,

a first phase adjustment circuit coupled to receive input samples from the analog-to-digital converter and operable to adjust a phase value of each input sample responsive to a first phase adjustment signal to thereby generate a corresponding phase-adjusted input sample, with groups of the input samples corresponding to sequentially received OFDM symbols;

a second phase adjustment circuit coupled to the FFT circuit to receive output components from the FFT, the second phase adjustment circuit operable to adjust a phase value of each output component responsive to a second phase adjustment signal to thereby generate phase-adjusted output components corresponding to a particular OFDM symbol; and

a phase correction circuit coupled to the first and second phase adjustment circuits,

the phase correction circuit operable to generate the first phase adjustment signal having a value that is a function of the values of the phase-adjusted output components for a particular OFDM symbol, and operable to delay application of the phase adjustment signal to the first phase

adjustment circuit for approximately a first delay time at which a first input sample of a subsequent OFDM symbol is applied to the first phase adjustment circuit, and

the phase correction circuit further operable to generate the second phase adjustment signal having a value that is equal to the value the first phase adjustment signal for a second delay time and that is thereafter equal to a new value of the first phase adjustment signal associated with a subsequent OFDM symbol minus an initial value of the first phase adjustment signal associated with the prior OFDM symbol, the second delay time being equal to approximately the time between when the initial value of the first phase adjustment signal is generated and the time when the output components for a subsequent OFDM symbol that have been phase adjusted using that initial value are output from the FFT.

3. Note that the amendment set forth above is needed in order to arrange claims 15 and 16 distinctly appear in separated paragraphs.

REASONS FOR ALLOWANCE

4. Claims 2, 3, 7-25, 28-30, 32, 33 and 36-39 are allowed.

5. The following is an examiner's statement of reasons for allowance:

-Regarding independent claim 2, none of prior art of record teaches or suggests a carrier tracking circuit, comprising: a first phase adjustment circuit having a phase adjustment input and an output; a delay element having an input coupled to the output of the first phase adjustment circuit and having an output; a second phase adjustment circuit having a component input coupled to the output of the delay element, a phase adjustment input, and an output; and a phase correction circuit having an input coupled to the output of the second phase adjustment circuit and a first output coupled to the phase adjustment input of the first phase adjustment circuit, the

phase correction circuit including a double phase correction circuit having an input coupled to the first output and having a second output coupled to the phase adjustment input of the second phase adjustment circuit; and feed forward phase correction circuit having a control input coupled to the first output of the phase correction circuit, and having a component input coupled to the output of the second phase adjustment circuit.

-Regarding independent claim 7, none of prior art of record teaches or suggests a carrier tracking circuit, comprising: a first phase adjustment circuit adapted to receive input samples and operable to adjust a phase value of each input sample responsive to a first phase adjustment signal to thereby generate a corresponding phase-adjusted input sample; a delay element coupled to the first phase adjustment circuit and operable to generate a group of output components responsive to a group of the phase-adjusted input samples; a second phase adjustment circuit coupled to the delay component to receive the output components, the second phase adjustment circuit operable to adjust a phase value of each output component responsive to a second phase adjustment signal to thereby generate phase-adjusted output components; and a phase correction circuit coupled to the first and second phase adjustment circuits, the phase correction circuit operable to generate the first phase adjustment signal having a value that is a function of the values of the phase-adjusted output components for a particular symbol, and operable to delay application of the phase adjustment signal to the first phase adjustment circuit for approximately a first delay time at which a first input sample of a subsequent symbol is applied to the first phase adjustment circuit, and the phase correction circuit further operable to generate the second phase adjustment signal having a value that is equal to the value the first phase adjustment signal for a second delay time and that is thereafter equal to a new value of the first phase adjustment

signal associated with a subsequent symbol minus an initial value of the first phase adjustment signal associated with the prior symbol.

-Regarding independent claim 16, none of prior art of record teaches or suggests an OFDM receiver, comprising an analog-to-digital converter, a parallel-to-serial converter , FFT circuit and a carrier tracking circuit, the carrier tracking circuit coupled to the analog-to-digital converter and to the parallel-to-serial converter, the carrier tracking circuit including, a first phase adjustment circuit coupled to receive input samples from the analog-to-digital converter and operable to adjust a phase value of each input sample responsive to a first phase adjustment signal to thereby generate a corresponding phase-adjusted input sample, with groups of the input samples; a second phase adjustment circuit coupled to the FFT circuit to receive output components from the FFT, the second phase adjustment circuit operable to adjust a phase value of each output component responsive to a second phase adjustment signal to thereby generate phase-adjusted output components; and a phase correction circuit coupled to the first and second phase adjustment circuits, the phase correction circuit operable to generate the first phase adjustment signal having a value that is a function of the values of the phase-adjusted output components for a particular OFDM symbol, and operable to delay application of the phase adjustment signal to the first phase adjustment circuit for approximately a first delay time at which a first input sample of a subsequent OFDM symbol is applied to the first phase adjustment circuit, and the phase correction circuit further operable to generate the second phase adjustment signal having a value that is equal to the value the first phase adjustment signal for a second delay time and that is thereafter equal to a new value of the first phase adjustment signal

associated with a subsequent OFDM symbol minus an initial value of the first phase adjustment signal associated with the prior OFDM symbol.

-Regarding independent claim 21, none of prior art of record teaches or suggests an OFDM communication system comprising an analog-to-digital converter, a parallel-to-serial converter , FFT circuit and a carrier tracking circuit, the carrier tracking circuit coupled to the analog-to-digital converter and to the parallel-to-serial converter, the carrier tracking circuit including a first phase adjustment circuit coupled to receive input samples from the analog-to-digital converter and operable to adjust a phase value of each input sample responsive to a first phase adjustment signal to thereby generate a corresponding phase-adjusted input sample, with groups of the input samples; a second phase adjustment circuit coupled to the FFT circuit to receive output components from the FFT, the second phase adjustment circuit operable to adjust a phase value of each output component responsive to a second phase adjustment signal to thereby generate phase-adjusted output components; and a phase correction circuit coupled to the first and second phase adjustment circuits, the phase correction circuit operable to generate the first phase adjustment signal having a value that is a function of the values of the phase-adjusted output components for a particular OFDM symbol, and operable to delay application of the phase adjustment signal to the first phase adjustment circuit for approximately a first delay time at which a first input sample of a subsequent OFDM symbol is applied to the first phase adjustment circuit, and the phase correction circuit further operable to generate the second phase adjustment signal having a value that is equal to the value the first phase adjustment signal for a second delay time and that is thereafter equal to a new value of the first phase adjustment

signal associated with a subsequent OFDM symbol minus an initial value of the first phase adjustment signal associated with the prior OFDM symbol.

-Regarding independent claim 28, none of prior art of record teaches or suggests a method of correcting for frequency offset in a communications system that communicates data symbols, the method comprising: generating a first group of frequency components by applying an FFT algorithm to a group of time domain input samples; calculating a phase adjustment value from the group of frequency components; adjusting the phase values of subsequent groups of time domain input samples corresponding to subsequent symbols in using the calculated phase adjustment value for a prior symbol, the phase values of the subsequent time domain input samples being adjusted prior to applying the FFT algorithm to these input samples; adjusting the phase values of the groups of frequency components generated by the FFT algorithm for a given symbol using the phase adjustment value calculated from the frequency components of a prior symbol; and when a given symbol has the phase values of the corresponding time domain input samples adjusted using the phase adjustment value calculated from a particular prior symbol, compensating for this adjustment to the time domain input samples when adjusting the phase values of the group of frequency components corresponding to this given symbol wherein each group of time domain input samples includes r(1)-r(N) input samples; and wherein adjusting the phase values of subsequent groups of time domain input samples includes subtracting a phase increment from the phase values for each of the time domain input samples r(1)-r(N) in a group.

-Regarding independent claim 36, none of prior art of record teaches or suggests a method of correcting for frequency offset for OFDM symbols, each OFDM symbol including a plurality of corresponding time domain input samples and a plurality of corresponding frequency

components, each time domain input sample and each frequency component having an associated phase and magnitude, the method comprising: calculating a phase adjustment value from the frequency components of each OFDM symbol; adjusting the phases of the time domain input samples of at least one prior OFDM symbol using the calculated phase adjustment value for a prior OFDM symbol; adjusting the phases of the frequency components of at least one prior OFDM symbol using the calculate phase adjustment value for a prior OFDM symbol; and adjusting the phases of the frequency components of a given OFDM symbol using the calculated phase adjustment value for that OFDM symbol wherein adjusting the phases of the frequency components of a given OFDM symbol using the calculated phase adjustment value for that OFDM symbol comprises: multiplying the calculated phase adjustment value by a feed forward scale factor to generate a feed forward offset value; and subtracting the feed forward offset value from each of the frequency components of the given OFDM symbol.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuong Phu whose telephone number is 571-272-3009. The examiner can normally be reached on M-F (8:00 AM - 4:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phuong Phu
Primary Examiner
Art Unit 2611

Phuong Phu

PHUONG PHU
PRIMARY EXAMINER

Phuong Phu
08/23/07